



Explanatory model of cyberbullying, cybervictimization, aggressiveness, social anxiety, and adaptation to university: a structural equation analysis

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Abstract

The increase in the number of cases of cyberbullying and cybervictimisation among university students and the scarce amount of research on the subject justify the need to analyse its relationship with psychological and social variables to prevent its appearance and impact. The aim of this study was to establish and contrast the fit of an explanatory model on cyberbullying and cybervictimization based on its relationship with aggressiveness, social anxiety and adaptation to university using a structural equations analysis. A total of 1,368 Spanish university students aged 18–49 ($M=21.34$; $SD=4.45$) completed a battery of questionnaires with the aim of assessing cyberbullying, aggressiveness, social anxiety, and adaptation to university. An adjusted structural equations model was obtained ($\chi^2=198.53$; $df=39$; $p<.001$; $CFI=.96$; $NFI=.96$; $IFI=.96$; $RMSEA=.06$). Significant relationships are observed, aggressiveness is negatively related to adaptation to university and positively with cybervictimization. A negative relationship has also been observed between cybervictimization and adaptation to university and a positive relationship with cyberbullying. Indirect effects have not been observed between aggressiveness and cyberbullying and between social anxiety and cybervictimization through adaptation to university. Therefore, social anxiety does not act as a mediator in the relationship with adaptation to university. These results suggest the importance of efforts to promote coping strategies management of aggression and empowerment of student adaptation in the university context to prevent cybervictimization and cyberbullying. Contributions and implications of the results are discussed.

Keywords Cyberbullying · Cybervictimization · Aggressiveness · Social anxiety · Adaptation to university

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Introduction

With the increased access to the internet, technology and social media, the problem of cyberbullying has been on the rise (Shaikh et al., 2020). In recent years, the use of social networks has increased exponentially, which has led to a significant increase in cyberbullying (Lepe-Faundez et al., 2021). Cyberbullying is understood as an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself (Smith et al., 2008). Cyberbullies attack victims by sending demeaning or threatening messages, and delivering images using websites, instant messages, blogs, chat rooms, mobiles, e-mails, and personal online profiles (Ali & Shahbuddin, 2022).

The prevalence of cyberbullying in adolescents is highly variable according to the studies; it ranges from 5 to 72% (Zych et al., 2016), with an average incidence of 23% for cybervictims, 16% for cyberbullies, and 18% for the dual role of cyberbully victim (Buelga et al., 2017). However, there is more agreement among the authors about the fact that more cyberbullies are boys and more cybervictims are girls (Buelga et al., 2022). Moreover, more cyberbullying victims are observed in students in the first stage of secondary school (junior high), and more cyberbullies and cyberbully victims are found in older students (Kowalski et al., 2014). In the case of university students, rates like those of adolescents are observed for the different roles observed (Aparisi et al., 2021; Martínez-Monteagudo et al., 2021). Particularly, university students are at a risky position for cyberbullying as they can easily access the Internet and communicate more in the virtual environment compared with other age groups due to the frequent use of smartphones, computers, and the Internet (Gönültaş, 2022; Qudah et al., 2020).

Recent literature reviews emphasize that consequences of cyberbullying experiences among college students are at least as serious as those of cyberbullying and bullying among school students. Among others, frequent experiences of cyberbullying among university students are related to poor social competence, increased psychological stress, negative feelings (e.g. sadness, fear), mental disorders (e.g. depression (Alrajeh et al., 2021), social anxiety), suicidality and/or suicidal ideation (Martínez-Monteagudo et al., 2020a, 2020b), increased substance use (e.g. alcohol), social media addiction (Çimke & Cerit, 2021), decreased self-esteem and academic performance, avoidance, or early dropout (Donat et al., 2022; Lei et al., 2020).

In terms of participation, there are distinct roles: cyberbullies, cybervictims, those not involved or spectators, and victimized cyberbullies. The latter group is of particular relevance as it some victimization processes, such as the anonymity given by technological resources, can predict the aggressive response of many adolescents (Cuadrado, Fernández, & Martín-Mora, 2019) and in university students subsequently (Luo et al., 2023) In this sense, different studies have found a strong positive relationship between cybervictimization and cyberaggression (Sun et al., 2020; Walrave & Heirman, 2011).

Cyberbullying, cybervictimization and aggressiveness

Aggressiveness is a tendency to convey anger, to have hostile ideation and to be involved in physical or verbal aggression, thus, it is a personality trait that comprises, and also predicts, aggressive behaviours (Buss & Perry, 1992; Wang et al., 2020).

Students involved in university education are subjected to strenuous circumstances in their striving for success during training. This scenario often forms the breeding ground for aggression towards the self and others. Despite this, truly little research has been published on the nature of the aggression experienced by university students (Myburgh et al., 2020).

One of the first studies in this regard investigated the extent of cyberbullying and victimization in a group of 254 Turkish university students. The results revealed a moderate relationship between cyberbullying and victimization (Akbulut & Eristi, 2011).

Regarding the relationship between cyberbullying and aggressiveness, the study by Dou et al. (2020), in a sample of 1183 Chinese university students and using structural equation modelling, showed a significant positive correlation between cybervictimization, trait anger and cyberbullying perpetration. Cybervictimization also predicted college students cyberbullying perpetration through the mediating effects of trait anger.

Moreover, Ak et al. (2015) analysed the direct and indirect relationships between cybervictimization, anger and cyberbullying in a sample of 687 university students using structural equation modelling. The results showed evidence of indirect effects of cybervictimization on cyberbullying mediated by anger. Finally, Wang et al. (2017) study with a sample of 464 Chinese university students concluded that trait anger was significantly and positively associated with cyberbullying.

Cyberbullying, cybervictimization and social anxiety

One of the variables related to cyberbullying that have been studied in recent years is social anxiety. Social anxiety is a common human experience characterized by an intense fear of evaluation from others in social situations (Morrison & Heimberg, 2013). Numerous studies have strongly corroborated how victims of cyberbullying present elevated levels of social anxiety (Coelho et al., 2022; Marciano et al., 2020, Escortell et al., 2020; Molero et al., 2022) in adolescent samples.

In the case of university students, there are fewer studies examining the relationship between cyberbullying, cybervictimization and social anxiety. Wang et al. (2019) studied the relationship between cyberbullying and depression as mediated by social anxiety and neuroticism in 476 university students. The results showed that cyberbullying had a significant and positive predictive effect on depression and social anxiety partially mediated this relationship. Escortell et al. (2020) analysed the predictive capacity of certain emotional problems (anxiety, depression, and stress) and university adjustment to cyberbullying in victims and aggressors in

a sample of 1,282 Spanish university students. The results indicated that elevated levels of depression, anxiety and stress increase the probability of being a victim of cyberbullying, while elevated levels of depression increase the probability of being a cyberbully.

Cyberbullying, cybervictimization and adaptation to university

Cyberbullying in the university context is a less studied reality compared to its investigation in previous educational stages, although it is a growing phenomenon over time. As Bernardo et al. (2020) point out, this could be due to the idea that a certain emotional maturity is assumed at university and that relational problems should be reduced. However, entering university is a time of particular stress due to the novelty, the search for new friendships, independence and new uses of information and communication technologies, now without parental supervision, which pose a risk of suffering or carrying out behaviours related to cyberbullying (Khine et al., 2020).

One of the consequences of cyberbullying among university students is the possibility of dropping out of university. In this regard, the study by Bernardo et al. (2022) analysed the relationship between the intention to complete or not complete higher education and having been a victim of cyberbullying in a sample of 1,653 Spanish university students. The results indicated that there was a relationship between having been a victim of cyberbullying and the intention to drop out of university, related to poor adjustment to the context.

Regarding the relationship between cyberbullying and university adaptation, there are very few studies examining the relationship between cyberbullying, cybervictimization, and college adjustment. The study by Martínez-Monteaudo et al. (2020a) confirmed, in a sample of 1282 university students, that elevated levels of personal-emotional, academic, and institutional adjustment decrease the likelihood of being a victim of cyberbullying. The study by Chen et al. (2020) aimed to analyse the relationship between parental emotional warmth and college students' cyberbullying perpetration attitudes and the mediating roles of gratitude and trait empathy in a sample of 1198 college students. Results showed that emotional warmth, gratitude, and cognitive and affective empathy showed significantly positive relationships with each other and negative correlations with cyberbullying perpetration attitudes. Therefore, we can assume that good personal and family adjustment is a good indicator for subsequent adjustment in the university context and avoids cyberbullying situations.

Aggressiveness, social anxiety, and adaptation to university

Social interaction is one of the main means of learning in educational contexts, such as universities. In order to learn together, students interact with each other and with their teachers in various learning situations (Pörhölä et al., 2019). However, the presence of aggressive behaviour in secondary education raises the need to address this issue also in the university context.

Aggressiveness among university students takes many forms and includes behaviours such as: spreading unpleasant rumours on the basis of race, disability, gender, religion, and sexual orientation; ridiculing or demeaning a person; social exclusion; unwanted sexual advances; stalking; threatening someone, either directly or online; revealing personal information about a person that was shared in confidence (Cowie and Myers, 2016). Although cyberbullying appears to be increasing among university students, traditional forms (i.e. verbal, relational, physical) of bullying among peers still occur with some frequency. Furthermore, most research has focussed on studying the relationship between aggressive behaviour and students' academic performance in early grades and adolescents, but aggressive behaviour is also observed in the university context, the consequences of which affect students' physical, mental, social, and academic well-being, aspects related to adaptation.

In this regard, Choden et al. (2019) analysed the relationship of bullying on students and learning environments in a sample of 2,471 university students in Bhutan. The research results pointed to the negative effects of bullying on academic performance and on adaptation (Bernardo et al., 2022). Recently, the study by Ramos-Rodríguez (2021) with a sample of university students concluded that low academic performance and adaptation was significantly associated with the type of career, being ignored, being threatened to scare them, suffering violence due to social exclusion, bullying in general, bullying due to social exclusion, physical and sexual harassment.

The university context involves a set of personal demands, not only at the academic but also at the social level. Students with mental health issues such as anxiety disorders usually develop a feeling of isolation and poor mental health. In this regard, recent studies such as that of Su-Yung et al. (2022) found a negative relationship between social anxiety and adaptation to university life in a group of Chinese university students. Similarly, Kayani et al. (2023) found a negative relationship between social anxiety and university adjustment in a sample of 975 university students in Pakistan.

The present study

Most of the investigations of cyberbullying have been conducted with students in elementary, middle, and high school who were between 9 and 18 years old (Evan-gelio et al., 2022). However, university students are under an elevated level of pressure to succeed that can often promotes aggression towards self, others and even the environment. Among the variables related to suffering or engaging in cyberbullying behaviour, aggressiveness, social anxiety, and adaptation to university stand out, but the relationship between them is currently unclear.

Considering the literature review and the above, the present study proposes to define and contrast a structural equation model to analyse the relationship between aggression, social anxiety, adaptation to university, cyberbullying and cybervictimization in university students. Structural equation models are a very powerful tool for explicitly formalizing relatively complex theories, allowing them to be tested and

making it possible to include complex or hierarchical relationships between multiple variables (Ruiz et al., 2010).

Based on previously reviewed studies, it is expected that aggressiveness will be positively associated with cyberbullying and cybervictimization (Hypothesis 1). Moreover, it is anticipated that social anxiety will also be positively associated with cyberbullying and cybervictimization (Hypothesis 2). In addition, it is anticipated that adaptation to university will be negatively associated with cyberbullying and cybervictimization (Hypothesis 3). Finally, aggressiveness is expected to positively relate to social anxiety (Hypothesis 4) and aggressiveness and social anxiety is expected to negatively relate to adaptation to university (Hypothesis 5).

Method

Participants

The reference population was undergraduate university students at the Universities of Valencia and Alicante (Spain). Two-stage random cluster sampling was conducted. In the first stage, three public universities were randomly selected in Valencia and Alicante. Once the universities were selected, in the second stage of sampling, eight classes were randomly selected from each university. Once the classes were selected, a random selection was carried out and 1,404 students were chosen from three universities, of which 36 were eliminated due to omissions or errors in the tests. Due to the random sampling method, the socioeconomic status and ethnic compositions of the overall sample are assumed to be representative of the community in terms of key variables (e.g. ethnicity, academic performance, etc.). Therefore, a total of 1,368 university students (494 males; 36% and 874 females; 64%) participated in the research in the following academic years: 1st year (45%), 2nd year (21.9%), 3rd year (12.1%), and 4th year (20.9%). The mean age of the participants was between 18 and 49 years ($M=21.34$; $SD=4.45$).

By means of the Chi-square test, used to analyse the homogeneity of the frequency distribution, it was found that there were no statistically significant differences between the sex of the participants and the year of study ($\chi^2=18.44$; $p=0.66$).

Instruments

European cyberbullying intervention project questionnaire (ECIPQ)

The Spanish version of the questionnaire European Cyberbullying Intervention Project Questionnaire (ECIPQ) (Del Rey et al., 2015) was used to assess cyberbullying. It is a scale consisting of 22 Likert-type items with five response options, with a scoring system between 0 (never) and 4 (always). It has two dimensions: Cybervictimization and Cyberaggression. For both dimensions, the items refer to actions like saying mean things (“Someone has called me names or insulted me using the Internet or cell phone messages”), excluding individuals or spreading rumours about

them (“I have been left out (excluded/ignored) or blocked from a social network platform or chat”), impersonating (“Someone has created a fake email account or profile on social networks to impersonate me”), etc. These items refer to actions that happen on electronic media and refer to a time interval of the last two months.

The factor solution found in a European sample (Del Rey et al. (2015) confirms two correlated factors with an optimal fit, obtaining fit indices with χ^2 S-B = 495.93, $p=0.00$, NNFI = 0.98, CFI = 0.98, IFI = 0.98, RMSEA = 0.04, SRMR = 0.06. The scale has adequate reliability indices for this study (α cybervictimization = 0.80, α cyberaggression = 0.88).

Aggression questionnaire (AQ)

This is an instrument (Buss & Perry, 1992; adapted by Andreu et al., 2002) consisting of 29 items that refer to aggressive behaviours and feelings and are coded through a 5-point Likert-type scale (*Completely false for me* = 1; *Completely true for me* = 5). It consists of four scales: Verbal Aggressiveness (“My friends say I argue a lot”), Physical Aggressiveness (“I often find myself getting into fights”), Hostility (“sometimes I am quite envious”), and Anger (“I feel angry, as if I am going to explode”), which assess the three components of aggressiveness: motor/behavioural (physical and verbal aggression), cognitive (hostility), and physiological-emotional (anger). The robustness of fit of the confirmatory factor analysis model of the Aggression Questionnaire provides good results in the Spanish sample (RMR = 0.05, GFI = 0.93, AGFI = 0.92, RMSEA = 0.05). It presents a tetrafactorial structure providing further cross-cultural empirical evidence of its construct validity. The internal consistency coefficients of the AQ scores in this study were acceptable: Physical Aggressiveness ($\alpha=0.77$), Verbal Aggressiveness ($\alpha=0.74$), Anger ($\alpha=0.64$), Hostility ($\alpha=0.75$), and total AQ score ($\alpha=0.90$).

Social anxiety questionnaire for adults (SAQ-A30)

This instrument (Caballo et al., 2010) consists of 30 items that are scored on a five-point Likert-type scale, from 1 = *Not at all or very little discomfort, tension, or nervousness*, to 5 = *a lot or extreme amounts discomfort, tension, or nervousness*. It evaluates five dimensions of social anxiety: (1) Speaking in public/Interacting with people of authority (“A teacher in class or a superior in a meeting asked me a question”), (2) Interacting with strangers (“Having a conversation with a person I just met”), (3) Interacting with the opposite sex (“Asking an attractive person of the opposite sex to go out with me”), (4) Assertive expression of annoyance, displeasure, or anger (“Expressing my anger at a person who is picking on me”), and (5) Being embarrassed or ridiculed (“Greeting a person and it not being reciprocated”). The five correlated factors model found in a Spanish sample constitutes an adequate representation of social anxiety, which is proof of validity based on the factorial structure of the SAQ-A30 ($\chi^2=7364.00$, χ^2 S-B = 10714.90, RMSEA = 0.05, NFI = 0.97 TLI = 0.97 CFI = 0.97 IFI = 0.97, SRMR = 0.05). The scale has adequate reliability indices, ranging between 0.74 and 0.87 for the dimensions scores.

Student adaptation to college questionnaire (SACQ)

The SACQ (Baker & Siryk, 1989) is a 50-item self-report designed to measure the students' ability to adapt to the university environment. This questionnaire presents full-scale test scores and four subscales: Social, Academic, Emotional, and Personal Adjustment. Participants who take this questionnaire are evaluated on a 5-point Likert-type scale ranging from 1 (“*Does not fit me at all*”) to 5 (“*Fits me perfectly*”). The test measures a student's success in coping with various educational demands in terms of their university experience, efficacy in coping with interpersonal social demands at university, feelings about their physical and psychological state, and an assessment of the overall university experience (“I am satisfied with my decision to attend college”).

The four-factor model proposed by Baker and Siryk (1989) is acceptable, as values < 0.08 for RMSEA (0.07), values > 0.90 for CFI (0.91), and values χ^2/df ratio (2.72) < 3 indicate an acceptable fit. The instrument has a sufficient reliability for each of the subscales and for the satisfactory overall score ($\alpha > 0.80$). In this study, an overall score drawn from the questionnaire items was used, using an adequate scale reliability indicator ($\alpha = 0.82$).

Procedure

First, once the centres had been selected, a meeting was held with the management team of the faculties to explain the objectives of the research work and the evaluation instruments to be used to request their permission and encourage their collaboration. The questionnaires were completed voluntarily and were done collectively during a class session, ensuring the anonymity of the participants by means of identification numbers on the answer sheets. The researchers were present during the completion of the tests so to clarify possible doubts and verify that correct administration had been done. Emphasis was placed on the total completion of the tests, with an average time for each questionnaire of approximately 15 min being used to do them. The study, including means of consent used, has been approved by the University of xxxxxx Research Ethics Committee (UA-2022-03-21). The regulations regarding research on human beings were respected in accordance with the ethical principles of the Declaration of Helsinki.

Statistical analysis

IBM SPSS (version 22.0) statistical software was used to perform the basic descriptive analyses and Rho Spearman correlation coefficients, recommended for non-normal scores. For analysis of the potential relationships existing between study variables, a structural model was designed to establish the relationships between the constructs intervening in the study. These data were calculated using the IBM AMOS 23 program to obtain the covariance matrix of the examined variables. The program is useful for these analyses since the main study constructs are made up of

various observed variables (Hoyle et al. 1994). After verifying that the distribution of the scores was non-normal (Mardia’s coefficient: 51.63 multivariate skewness and 52.09 multivariate kurtosis), the Unweighted least squares method was selected.

The complete structural equations model consists of 12 observed variables and 2 latent variables to measure the indicators (see Fig. 1). In this model, the causal explanations of the latent variables are formulated based on the relationships observed between indicators, considering the reliability of the measurements. Measurement errors are also included in the model, permitting their direct control. Uni-directional arrows are lines of influence between the lateral and observable indicators and are interpreted as multivariate regression coefficients. Bi-directional arrows reveal the relationship between latent variables, which also represent regression coefficients.

Aggressiveness acts as an exogenous variable, influencing four indicators: hostility (AQH), verbal aggression (AQV), anger (AQA) and physical aggression (AQP). Social anxiety also acts as an exogenous variable and influences five indicators: speaking in public/interacting with people of authority (SAQF1), being embarrassed, or ridiculed (SAQF2), assertive expression of annoyance, displeasure, or anger (SAQF3), interacting with the opposite sex (SA3F4), and interacting with strangers (SAF5). Adaptation to university (AU) as an endogenous variable, receiving the effect of social anxiety and aggressiveness. In addition, cybervictimization (CV) and cyberbullying (CB) receives the influence of social anxiety, aggressiveness, and adaptation to university, thereby acting as endogenous variables.

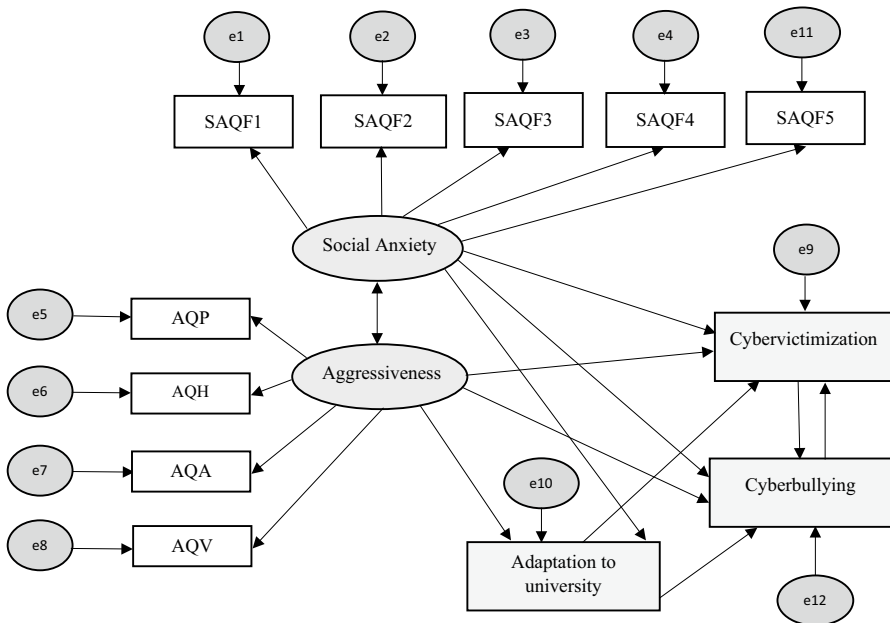


Fig. 1 Model theories. *SAQF1* speaking in public/Interacting with people of authority. *SAQF2* being embarrassed or ridiculed. *SAQF3* assertive expression of annoyance, displeasure, or anger. *SAQF4* interacting with the opposite sex. *SAQF5* interacting with strangers. *AQP* physical aggression. *AQH* hostility. *AQA* anger. *AQV* verbal aggression

Bootstrap analysis was also used to estimate the 95% confidence intervals with bias correction for the direct and indirect effects of social anxiety on the association between social anxiety and cybervictimization, as well as between aggression and cybervictimization.

To verify the compatibility of the proposed model and the empirical data obtained, verification of the model's fit was performed. The following indexes were used to analyse the model's goodness of fit: the Chi-square coefficient, the Chi-square to its degrees of freedom (χ^2/df), the Comparative Fit Index (CFI), Normalized Fit Index (NFI), the Incremental Fit Index (IFI), the Root Mean Square Error of Approximation (RMSEA) plus its 90% confidence interval (CI), and the standardized root mean square residual (SRMR). Generally, values are considered acceptable if they are below 5 χ^2/df (Bentler, 1990), likewise for CFI and IFI values equal to or above 0.90, NFI values equal to above 0.95, RMSEA values below 0.08, and SRMR values of 0.06 or less (Hu & Bentler, 1999).

Results

Table 1 shows the correlations between cyberbullying, cybervictimization, social anxiety, aggressiveness, and adaptation to university, variables, and the descriptive statistics. As observed, cyberbullying correlates positively and statistically significantly with cyberbullying, with the "interacting with the opposite sex" factor of social anxiety, with the four dimensions of aggressiveness and negatively with adaptation to university. Cyberbullying correlates positively and statistically significantly with all four dimensions of aggression and negatively with adaptation to university. On the other hand, Adaptation to university correlates negatively and statistically significantly with the "interacting with the opposite sex" factor of social anxiety and with the four dimensions of aggressiveness. Finally, the different dimensions of social anxiety and aggressiveness correlate significantly with each other.

The proposed structural equations model revealed a good fit in all the assessment indices. The Chi-squared test revealed a significant value of p ($\chi^2_{S-B} = 198.53$; $df = 39$; $p < 0.001$); $\chi^2/df = 5.09$). This index, however, cannot be interpreted in this standardized manner, and there is also the problem of its sensitivity to sample size. Therefore, other normalized adjustment indices were used, which are less sensitive to sample size. The Comparative Fit Index (CFI) obtained an adequate value of 0.96. The Normalized Fit Index (NFI) resulted in a value of 0.96, and the Incremental Fit Index (IFI) had a value of 0.96, both of which are acceptable. The Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square Residual (SRMR) also had adequate values of 0.06 (CI90: 0.05-0.07) and 0.05, respectively. The variables included in the structural equations model explain 38% of the cybervictimization and 44% of the cyberbullying constructs. The model stability index was 0.223, therefore it can be considered as a stable model.

In Fig. 2 and Table 2, an estimate of the model parameters is presented.

Factorial loads of the indicators corresponding to the latent variables (social anxiety, and aggressiveness) and observed variables (adaptation to university, cybervictimization and cyberbullying) are mainly significant. Statistically significant

Table 1 Descriptive analyses and correlations for variables included in the study

Variables	1	2	3	4	5	6	7	8	9	10	11	12
1. CV	1.00											
2. CB	0.60**	1.00										
3. AU	-0.15**	-0.12**	1.00									
4. SAQ: F1	-0.00	-0.02	0.03	1.00								
5. SAQ: F2	0.04	0.01	0.01	0.65**	1.00							
6. SAQ: F3	0.04	0.01	-0.03	0.57**	0.66**	1.00						
7. SAQ: F4	0.03	0.02	0.00	0.63**	0.62**	0.59**	1.00					
8. SAQ: F5	0.07**	0.03	-0.05*	0.68**	0.60**	0.59**	0.63**	1.00				
9. AQ: P	0.24**	0.29**	-0.10**	-0.07**	-0.01	-0.05	0.02	0.01	1.00			
10. AQ: H	0.22**	0.21**	-0.13**	0.28**	0.37**	0.29**	0.32**	0.33**	0.34**	1.00		
11. AQ: A	0.15**	0.19**	-0.05	0.21**	0.30**	0.18**	0.22**	0.18**	0.37**	0.64**	1.00	
12. AQ: V	0.18**	0.23**	-0.10**	0.03	0.13**	0.03	0.11**	0.07**	0.44**	0.51**	0.61**	1.00
Statistics												
<i>M</i>	14.43	13.49	23.28	16.95	17.18	15.75	18.26	14.14	17.33	19.57	18.24	11.54
<i>SD</i>	4.17	3.59	4.14	5.50	4.86	4.93	5.70	5.20	5.13	5.72	4.77	3.84
Skewness	2.62	3.54	-.57	.11	.03	.16	-.03	.40	.92	.27	.17	.48
Kurtosis	10.18	18.12	-.23	-.67	-.61	-.42	-.74	-.60	.86	-.36	-.24	-.16

** $p < .001$. CV Cybervictimization. CB Cyberbullying. AU Adaptation to university. SAQF1 Speaking in public/Interacting with people of authority. SAQF2 Being embarrassed or ridiculed. SAQF3 Assertive expression of annoyance, displeasure, or anger. SAQF4 Interacting with the opposite sex. SAQF5 Interacting with strangers. AQP Physical aggression. AQH Hostility. AQA Anger. AQV Verbal aggression

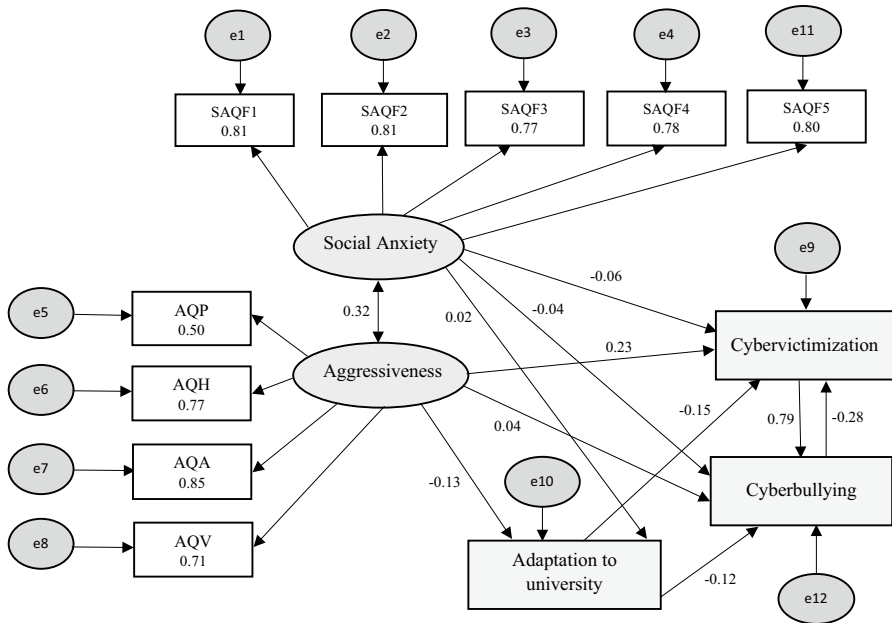


Fig. 2 Structural equations model. *SAQF1* speaking in public/Interacting with people of authority. *SAQF2* being embarrassed or ridiculed. *SAQF3* assertive expression of annoyance, displeasure, or anger. *SAQF4* interacting with the opposite sex. *SAQF5* interacting with strangers. *AQP* physical aggression. *AQH* hostility. *AQA* anger. *AQV* verbal aggression

relationships are observed ($p < 0.001$), which are positive and direct, amongst all the social anxiety dimensions. In addition, there are positive and direct relationships between aggressiveness and its dimensions ($p < 0.001$).

Upon analysing the factorial loads of the indicators corresponding to latent variables, it may be observed that they all have statistically significant differences at a level of $p < 0.001$, with direct and positive relationships. As for social anxiety, speaking in public/interacting with people of authority ($r = 0.81$) and being embarrassed or ridiculed ($r = 0.81$) are the indicators having the highest coefficient, followed by interacting with strangers ($r = 0.80$), interacting with the opposite sex ($r = 0.78$), and, ultimately, assertive expression of annoyance, displeasure, or anger ($r = 0.77$), having the lowest level. For aggressiveness, the greater association was found in anger ($r = 0.85$), followed by hostility ($r = 0.77$), verbal aggression ($r = 0.71$) and with a lower association, physical aggression ($r = 0.50$).

In addition, significant associations are observed between the variables ($p < 0.001$). Therefore, aggressiveness is negatively related to adaptation to university ($r = -0.13$). Along the same lines, the relationship between aggressiveness and cybervictimization is positive ($r = 0.23$). Finally, a negative relationship has also been observed between cybervictimization and adaptation to university ($r = -0.15$) and a positive relationship is seen between cybervictimization and cyberbullying ($r = 0.79$). Statistically significant indirect effects have not been observed ($p > 0.05$) between aggressiveness and cyberbullying and between social anxiety and

Table 2 Structural model values

Relationships between variables	Understandardized regression weights				Standardized regression weights
	Estimates	S.E	C.R	<i>p</i>	Estimates
Adaptation to university ← Aggressiveness	-.21	.05	-4.11	***	-0.13
Adaptation to university ← Social anxiety	.02	.02	.76	.44	0.02
Cyberbullying ← Aggressiveness	.06	.05	1.24	.21	0.04
Cybervictimization ← Social anxiety	-.06	.04	-1.31	.18	-0.06
Cybervictimization ← Aggressiveness	.37	.13	2.72	***	0.23
Cyberbullying ← Social anxiety	-.03	.02	-2.01	.04	-0.04
Cybervictimization ← Adaptation to university	-.15	.05	-3.04	***	-0.15
SAQF1 ← Social anxiety	1.00				0.81
SAQF2 ← Social anxiety	.89	.02	32.81	***	0.81
SAQF3 ← Social anxiety	.84	.02	30.05	***	0.77
SAQF4 ← Social anxiety	1.00	.03	31.49	***	0.78
SAQF5 ← Social anxiety	.93	.02	32.87	***	0.80
AQP ← Aggressiveness	1.00				0.50
AQH ← Aggressiveness	1.70	.10	16.91	***	0.77
AQA ← Aggressiveness	1.58	.09	17.35	***	0.85
AQV ← Aggressiveness	1.06	.06	17.02	***	0.71
Cyberbullying ← Cybervictimization	.68	.13	4.92	***	0.79
Cybervictimization ← Cyberbullying	-.32	.45	-.71	.47	-0.28

Note ** $p < .01$ (bilateral); *** $p < .001$ (bilateral). *C.R.* Critical Ratios; *SAQF1* Speaking in public/Interacting with people of authority. *SAQF2* Being embarrassed or ridiculed. *SAQF3* Assertive expression of annoyance, displeasure, or anger. *SAQF4* Interacting with the opposite sex. *SAQF5* Interacting with strangers. *AQP* Physical aggression. *AQH* Hostility. *AQA* Anger. *AQV* Verbal aggression

cybervictimization through adaptation to university. Therefore, social anxiety does not act as a mediator in the relationship with adaptation to university ($p > 0.05$).

Discussion

The objective of this study was to analyse the relationship between cyberbullying, cybervictimization, aggressiveness, social anxiety and adaptation to university in university students. According to the first hypothesis, the structural equations model confirms the existence of a direct, positive, and statistically significant relationship between aggressiveness and cybervictimization but not between aggressiveness and cyberbullying. Despite χ^2/df slightly exceeding the value of 5 points (5.09), it is considered that the model maintains an acceptable fit, since the other fit indicators (CFI, NFI, IFI, RMSEA, and SRMR) are also acceptable. These results are partially congruent with several studies that confirm the relationship between aggressiveness and cybervictimization (Aparisi et al., 2023; Hussain et al, 2023; Kokkinos &

Antoniadou, 2019; Lonigro et al., 2014; Quintana-Orts et al., 2020). In this sense, the study by De Pasquale et al. (2021) with 554 adolescents concluded that aggressiveness and anger were predictor variables of cybervictimization. In the case of university students, there is a lack of studies that have analysed the relationship between cyberbullying, cybervictimization and aggression. The study by Dou et al. (2020), in a sample of university students and using structural equation modelling, showed a significant positive correlation between cybervictimization, trait anger and cyberbullying perpetration. Cybervictimization also predicted college students cyberbullying perpetration through the mediating effects of trait anger.

In samples of adolescent students, numerous studies confirm the relationship between aggression and cyberbullying (Escortell, 2020; Peker & Nebioglu, 2021; Yang et al., 2020), but in the university context there are few studies that analyse this relationship. Ak et al. (2015) analysed the direct and indirect relationships between cybervictimization, anger and cyberbullying in a sample of 687 university students using structural equation modelling. The results showed evidence of indirect effects of cybervictimization on cyberbullying mediated by anger (Wang et al., 2017).

The results of our study do not show a significant relationship between aggression and cyberbullying. In this sense, it is true that few studies have been published on the nature of aggression in university students. This may be because it is a more subtle and defiant type of aggression, not as physical and visible as in the case of adolescents. In the university context, aggression is more indirect, which makes the environment more stressful and therefore more related to cybervictimization, as well as being mediated by other variables such as empathy and the students' own moral development (Myburgh et al., 2020).

As for social anxiety, the results did not confirm the second hypothesis, as there was no relationship between social anxiety, cyberbullying and cybervictimization. These results contradict those obtained in samples of adolescent students. For example, the study by Núñez et al. (2021) aimed to analyse the relationship of victimisation profiles obtained with social anxiety and self-esteem. The results concluded that the higher the level of victimization, the higher the social anxiety and the lower the level of self-esteem. In the case of cyberbullies, some authors point out that they have similar levels of social anxiety as cyberbullies, due to their lack of social skills (Kowalski et al., 2014). In the case of university students or young adults, some studies have shown increased levels of social anxiety due to the use of new technologies (Arikan et al., 2022), but it is not clear whether this is a cause or a consequence of cyberbullying and cybervictimisation. Some authors point out that having experienced cyberbullying is a significant risk factor for elevated levels of social anxiety (Jia et al., 2022). It is possible that social anxiety is less disabling in youth (due to the development of compensatory social skills, use of virtual social profile in online environments) and therefore, the use of technology in an autonomous way, leads them not to be more at risk of developing or suffering cyberbullying behaviours.

The results of this research confirmed the third hypothesis since adaptation to university was negatively related to cyberbullying and cybervictimization. These results are in line with those obtained by authors who point out that adjustment to the new conditions of the university context and having suffered experiences of cyberbullying and cybervictimisation in previous educational stages are related to worse social

adjustment. In this sense, the study by Souza et al. (2017) with university students showed that the relationship between having been a cybervictim and a cyberbully was influenced by the psychosocial climate of the campus, cultural aspects of the context, and the level of adjustment and feelings of well-being at university. Also, the study by Martínez-Monteagudo et al. (2020b) with university students concluded that a satisfactory level of personal, emotional, academic, and institutional adjustment decreases the likelihood of being a cybervictim. These results are highly relevant for guiding university education policies towards the inclusion and optimal adaptation of all students to prevent cyberbullying situations.

On the other hand, the results obtained confirmed the fourth hypothesis of the study, as a positive and bidirectional relationship was found between aggressiveness and social anxiety. As previous work suggests, social anxiety is related to perceived climate and is directly related to situations of conflict and aggression experienced in the educational context (Martínez-Monteagudo et al., 2017). Thus, students with an elevated level of social anxiety reported more episodes of violence in the school environment (Escortell et al., 2020). The university context is a particularly anxiogenic environment in the first year, which can predispose students to experience an elevated level of social anxiety due to academic and relational demands that can lead to aggressive situations and vice versa, to respond violently because of the elevated level of social anxiety experienced.

Finally, the data partially confirmed the fifth hypothesis since aggressiveness was negatively related to adaptation to university, but in the case of social anxiety the relationship was not statistically significant. Numerous studies have confirmed the direct and positive relationship between aggression and poorer adjustment in college students (Ali & Shahbuddin, 2022; Buyukiscan, 2018; Peled, 2019). In the case of social anxiety, it is true that most studies point out that college students with high social anxiety fear negative evaluation from others, feel distress and avoid social situations, which negatively affects their academic performance and mental health (Lin & Fan, 2022), impacting their level of adjustment, but this relationship is mediated by other psychological factors such as self-esteem and social support from others (Ran et al., 2018).

This research has some limitations. First, although the sampling used guarantees the representativeness of the sample, it would be useful to check whether the results obtained can be generalized to other educational levels (e.g. primary or secondary education) or in other sociocultural contexts. Secondly, it would be advisable to consider longitudinal designs to test the relationship between variables over the long term, not at a single point in time. In this regard, there is no causal relationship in the model and therefore, the temporal relationship of the variables is not confirmed by this study. Thus, it is possible that anxious symptoms, aggressiveness, cybervictimization temporally coincide with cyberbullying experiences. For example, Zhang et al. (2023) recently found a reciprocal relationship between peer victimization and engaging in cyberbullying behaviors in their sample of Chinese college students. However, a reciprocal relationship between cybervictimization, cyberbullying, and psycho-emotional adjustment variables could not be tested in our study, therefore, future research should use a longitudinal design with a larger and more diverse sample to address these questions. On the other hand, self-report techniques

pose another limitation in studies on cyberbullying, as social desirability bias may influence the results. Therefore, future research should take this bias into account and select new assessment methods that ensure better validity of the data collected and improve the current self-report instruments. Also, in future studies it would be relevant to analyze the overlap between online and offline bullying/victimization behaviours to assess the degree of overlap between peer bullying behaviours and means of realization, as well as the relationship between emotional and social management and regulation and the manifestation of bullying behaviours in young people. Finally, the influence of other mediating variables that may be interfering in the relationship between cyberbullying and the rest of the variables, such as personal (self-esteem, emotional intelligence, moral development, empathy), educational (academic self-concept), social and family (educational parental style), should be considered.

Conclusions

In conclusion, this study provides novel and relevant information on the phenomenon of cyberbullying and cybervictimization among university students. On the one hand, the existence of cyberbullying and cybervictimization in young university students is demonstrated. Although most of the research on cyberbullying focuses on adolescents, it is necessary to investigate the relationship between cyberbullying and cybervictimization with psychological and emotional variables that promote adaptation to university. In this sense, it has been found that aggressiveness is negatively related to adaptation to university and positively related to cyberbullying. Furthermore, a negative relationship was also observed between cybervictimization and adaptation to university and a positive relationship with cyberbullying. It is therefore recommended that high schools intervene at an early stage for the transition to university and promote interventions to reduce social anxiety, address worries and clarify false beliefs, while reinforcing coping and decision-making strategies, and aiming to maintain a good social climate among students (Larose et al., 2019). It is essential to work on factors that can improve adaptation to university, such as tutorial action, through the strengthening of social support, social self-efficacy, problem solving, coping strategies, training, and counseling, etc., and factors that reduce aggressiveness (emotional management, problem solving, frustration regulation, etc.). Furthermore, no indirect effects were observed between aggression and cyberbullying or between social anxiety and cybervictimisation through university adaptation. Therefore, social anxiety does not act as a mediator in the relationship with university adaptation.

Considering all these results, this research provides clarity on the phenomenon of cyberbullying and cybervictimisation in university students, knowing the differential profile of aggressors and victims, their relationship with psycho-emotional variables, with the aim of helping to design intervention programmes that help students adapt to the university context and prevent situations of cyberbullying and early school dropout.

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Declarations

Conflict of interest The authors declare that there is no conflict of interest.

Ethical approval and consent to participate Standards regarding research on humans were respected, in accordance with the ethical principles of the Declaration of Helsinki and the Ethics Committee (UA-2022-03-21).

Consent for publication The authors consent to the publication of the manuscript.

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